wherein $(p_{j,n} - p_{initial,j,n})$ represents the trace with the difference between the calculated subsurface parameter n at trace position j and the corresponding initial subsurface parameter, $w_{initial,n}$ is a weighting factor for the n^{th} parameter, #traces is the total number of traces, #parameters is the number of parameters and $L_{P,initial}$ is an adjustable norm of said difference.

8 ~~10.~~ (Original) The method according to claim 7, wherein a stabilization term is a measure for the deviation of the calculated subsurface parameters from a priori specified functional relationships between subsurface parameters.

9 ~~11.~~ (Original) The method according to claim 8 ~~10~~, wherein said measure comprises

$$F_{functions} = \sum_{v=1}^{\#functions} w_{functions,v} \sum_{j=1}^{\#traces} L_{P,functions} f_v(p_{j,\ldots,} p_{j,\#parameters})$$

wherein f_v represents the deviations of the subsurface parameters at trace j away from the v^{th} functional relationship between different subsurface parameters, $w_{functions,v}$ is a weighting function for the v^{th} functional relationship, #traces is the number of traces, #functions is the number of functional relations and $L_{P,functions}$ is an adjustable norm of said deviations.

12. (Original) The method according to claim 3, wherein a stabilization

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term is a measure for the lateral variability of the parameters.

13. (Original) The method according to claim 12, wherein said measure comprises

$$F_{lateral} = \sum_{n=1}^{\#parameters} \sum_{l=1}^{\#neighbors} \sum_{j=1}^{\#traces} w_{lateral,n}(r_{j,l})\, L_{P,lateral}(d_{j,l,n})$$

wherein $d_{j,n,l}$ is the difference of the samples of parameter p_n at traces j and l, corrected with any difference in the initial model, $w_{lateral,n}$ ($\tau_{j,l}$) is a trace for parameter n describing the weighting for each parameter sample where this weighting is a function of $\tau_{j,l}$ which is a trace which at each parameter sample provides a measure of the local correlation between the traces j and l, #traces is the number of traces, #neighbors is the number of neighboring traces used in the calculation, #parameters is the number of parameters and $L_{p,lateral}$ is the adjustable norm of said differences $d_{j,n,l}$.

14. (Original) The method according to claim 13, wherein the parameter difference $d_{j,l,n}$ is defined as

$$(d_{j,l,n})(t_k) = p_{l,n}(t_k + \Delta t_{j,l,k}) - p_{j,n}(t_k) - (p_{initial,l,n}(t_k + \Delta t_{j,l,k}) - p_{initial,j,n}(t_k))$$

wherein $\Delta t_{j,l,k}$ is the time shift at parameter sample k which time aligns the parameters of trace l to trace j at sample k, where surrounding trace samples are interpolated if at time $t_k + \Delta t_{j,k,l}$ a

37 35. (Original) The method according to claim 33, wherein the objective function comprises one or more stabilization terms and/or one or more correction terms.

38 36. (Original) The method according to claim 37 ~~35~~, wherein a stabilization term is a measure for the deviation of the reflectivity away from 0.

39 37. (Original) The method according to claim 38 ~~36~~, wherein said measure comprises

$$F_{reflectivity} = \sum_{i=1}^{\#stacks} w_{reflectivity,i} \sum_{j=1}^{\#traces} L_{P,reflectivity}(r_{i,j})$$

wherein $r_{i,j}$ is the reflectivity trace for stack i and trace j, $w_{reflectivity,i}$ is a weighting factor for stack i, #traces is the total number of traces, #stacks is the total number of stacks and $L_{P,reflectivity}$ is an adjustable norm of the reflectivities.

40 38. (Original) The method according to claim 37 ~~35~~, wherein a stabilization term is a measure for the parameter contrast.

41 39. (Original) The method according to claim 40 ~~38~~, wherein said measure comprises

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$$F_{contrast} = \sum_{n=1}^{\#parameters} w_{contrast,n} \sum_{j=1}^{\#traces} L_{P,\,contrastl}\ (c_{j,n})$$

wherein $c_{j,n}$ is the contrast trace for the n^{th} subsurface parameter, $w_{contrast,n}$ is a weighting factor for the n^{th} parameter, #traces is the total number of traces, #parameters is the number of parameters, and $L_{P,contrast}$ is an adjustable norm of the contrasts.

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44 40. (Original) The method according to claim ~~35~~, wherein a stabilization term is a measure for the deviation of the subsurface parameters from the initial subsurface parameters.

44

45 41. (Original) The method according to claim ~~40~~, wherein said measure comprises

$$F_{initial} = \sum_{n=1}^{\#parameters} w_{initial,n} \sum_{j=1}^{\#traces} L_{P,initial}(p_{j,n} - p_{initial,j,n})$$

wherein $(p_{j,n} - p_{initial,j,n})$ represents the trace with the difference between the calculated subsurface parameter n at trace position j and the corresponding initial subsurface parameter, $w_{initial,n}$ is a weighting factor for the n^{th} parameter, #traces is the total number of traces, #parameters is the number of parameters and $L_{P,initial}$ is an adjustable norm of said difference.

42. (Original) The method according to claim ~~39~~ 41, wherein a stabilization term is a measure for the deviation of the calculated subsurface parameters from a priori specified functional relationships between subsurface parameters.

43. (Original) The method according to claim 42, wherein said measure comprises

$$F_{functions} = \sum_{v=1}^{\#functions} w_{functions,v} \sum_{j=1}^{\#traces} L_{P,functions} f_v(p_{j,1},\ldots,p_{j,\#parameters})$$

wherein f_v represents the deviations of the subsurface parameters at trace j away from the v^{th} functional relationship between different subsurface parameters, $w_{functions,v}$ is a weighting function for the v^{th} functional relationship, #traces is the number of traces, #functions is the number of functional relations and $L_{P,functions}$ is an adjustable norm of said deviations.

46 ~~44~~. (Original) The method according to claim ~~35~~ 37, wherein a stabilization term is a measure for the lateral variability of the parameters.

47 ~~45~~. (Original) The method according to claim ~~44~~ 46, wherein said measure comprises

$$F_{lateral} = \sum_{n=1}^{\#parameters} \sum_{l=1}^{\#neighbors} \sum_{j=1}^{\#traces} w_{lateral,n}(r_{j,l})\, L_{P,lateral}(d_{j,l,n})$$

wherein $d_{j,n,l}$ is the difference of the samples of parameter p_n at traces j and l, corrected with any difference in the initial model, $w_{lateral,n}$ ($\tau_{j,l}$) is a trace for parameter n describing the weighting for each parameter sample where this weighting is a function of $\tau_{j,l}$ which is a trace which at each parameter sample provides a measure of the local correlation between the traces j and l, #traces is the number of traces, #neighbors is the number of neighboring traces used in the calculation, #parameters is the number of parameters and $L_{p,lateral}$ is the adjustable norm of said differences $d_{j,n,l}$.

48 ~~46.~~ (Original) The method according to claim 47 ~~45~~, wherein the parameter difference $d_{j,l,n}$ is defined as

$$(d_{j,l,n})(t_k) = p_{l,n}(t_k + \Delta t_{j,l,k}) - p_{j,n}(t_k) - (p_{initial,l,n}(t_k + \Delta t_{j,l,k}) - p_{initial,j,n}(t_k))$$

wherein $\Delta t_{j,l,k}$ is the time shift at parameter sample k which time aligns the parameters of trace l to trace j at sample k, where surrounding trace samples are interpolated if at time $t_k + \Delta t_{j,k,l}$ a sample is not defined, where $r_{j,l}$ is now the local correlation incorporating the time shift and $L_{P,lateral}$ is an adjustable norm on the parameter differences.

50 ~~47.~~ (Original) The method according to claim 33, wherein a correction term is a measure for the differential time shifts between traces of measured reflection data

stacks.

51 ~~48~~. (Original) The method according to claim 50 ~~47~~, wherein said measure comprises

$$F_{time} = \sum_{i=2}^{\#stacks} w_{time,i} \sum_{j=1}^{\#traces} L_{P,time}(\tau_{i,j} - \tau_{0\,i,j})$$

wherein $\tau_{0,i,j}$ is the trace with the initial time values of the time stretch and squeeze control points for stack i and trace j and $\tau_{i,j}$ is the time of shifted control points, $w_{time,i}$ is a weighting factor for stack i, #stacks is the number of stacks, #traces is the number of traces and $L_{P,time}$ is an adjustable normalization factor of the difference between $\tau_{0,i,j}$ and $\tau_{i,j}$.

52 ~~49~~. (Original) The method according to claim 33, wherein a stabilization term is a measure for the parameter differences between reflection data acquisition surveys taken at different points in time.

53 ~~50~~. (Original) The method according to claim 52 ~~49~~, wherein said measure comprises

$$F_{timelapse} = \sum_{k=2}^{\#surveys} w_{survey,k} \sum_{n=1}^{\#parameters} w_{parameters,n} \sum_{j=1}^{\#traces} L_{P,timelapse}(p_{j,n,k} - p_{j,n,k-1})$$

49 ~~63~~. (Original) The method according to claim 37 ~~35~~, wherein the seismic reflection data is determined from at least one of the following source-receiver combinations:

P-wave source and P-wave receiver, P-wave source and S-wave receiver, S-wave source and P-wave receiver, S-wave source and S-wave receiver.

64. (Original) The method according to claim 33, wherein the reflection data is echo-acoustic data and the subsurface is human or mammal tissue or any other material.

65. (Currently Amended) A device for determining from measured reflection data on a plurality of trace positions one or more subsurface parameters, the device comprising:

(a) input means for inputting at least the measured reflection data and one or more initial subsurface parameters defining an initial subsurface model;

(b) processing means for:

(i) preprocessing the measured reflection data into a plurality of partial or full stacks;

(ii) specifying a wavelet or wavelet or wavelet field for each of the partial or full stacks of the measured reflection data;

(iii) calculating synthetic reflection data based on the specified wavelets or wavelet fields and the initial subsurface parameters; and